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(54) A releasable climbing iron for an artificial climbing wall

(57) A releasable climbing iron comprises a circular cross-section body 12 rotatable for adjustment in an aperture 14 in a panel 16 of the wall. The body 12 has a shoulder 24 having a first bearing surface 26 co-operating with an edging 28 of the panel 16 and a second locating surface 30 disposed on the periphery of the front surface 18. The body 12 is secured by two locking means each comprising a retaining stud 40 so engageable in a notch 32 in the second surface 30 as to exert in the locked position a pressure on the shoulder 24 without the screw 42 extending through the clamping zone arranged between the first bearing surface 26 and the edging 28. The angular position of the climbing iron can therefore be adjusted rapidly.

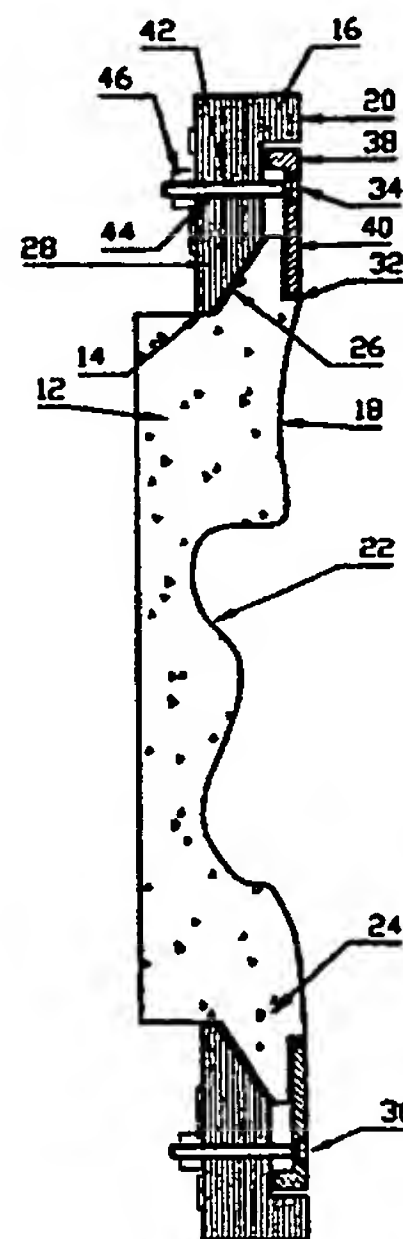
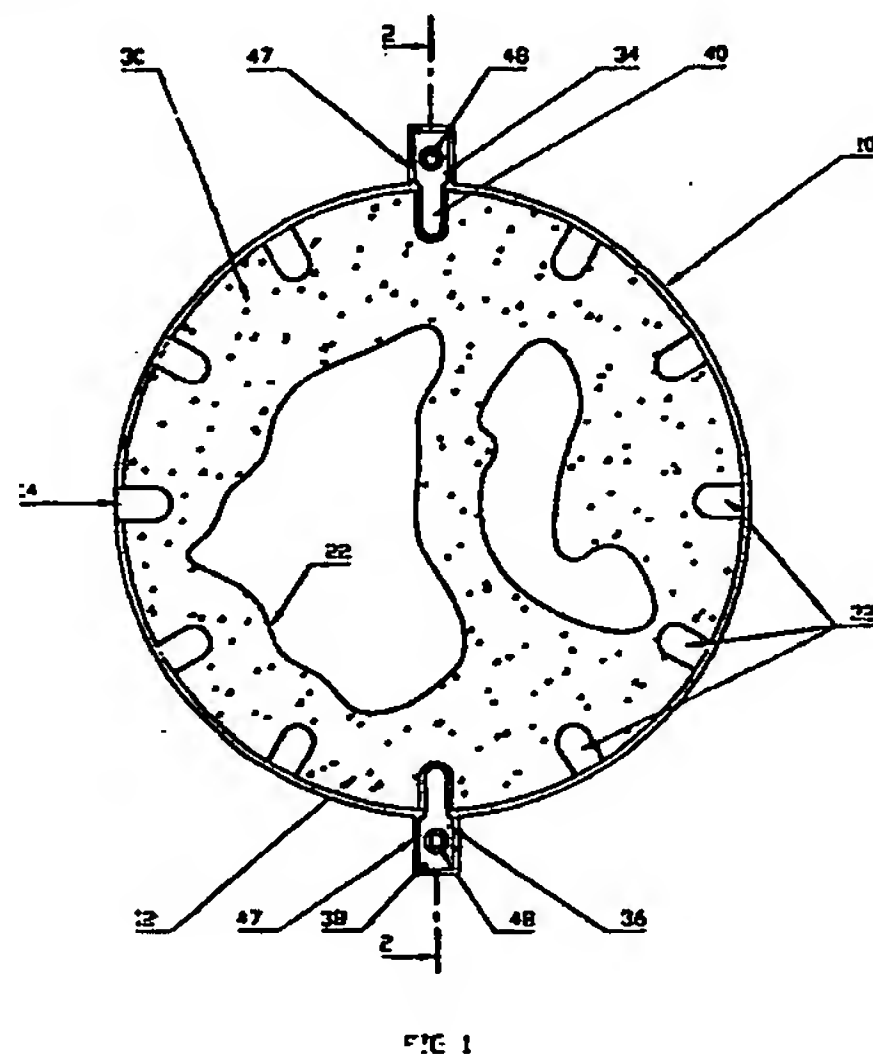


FIG 2

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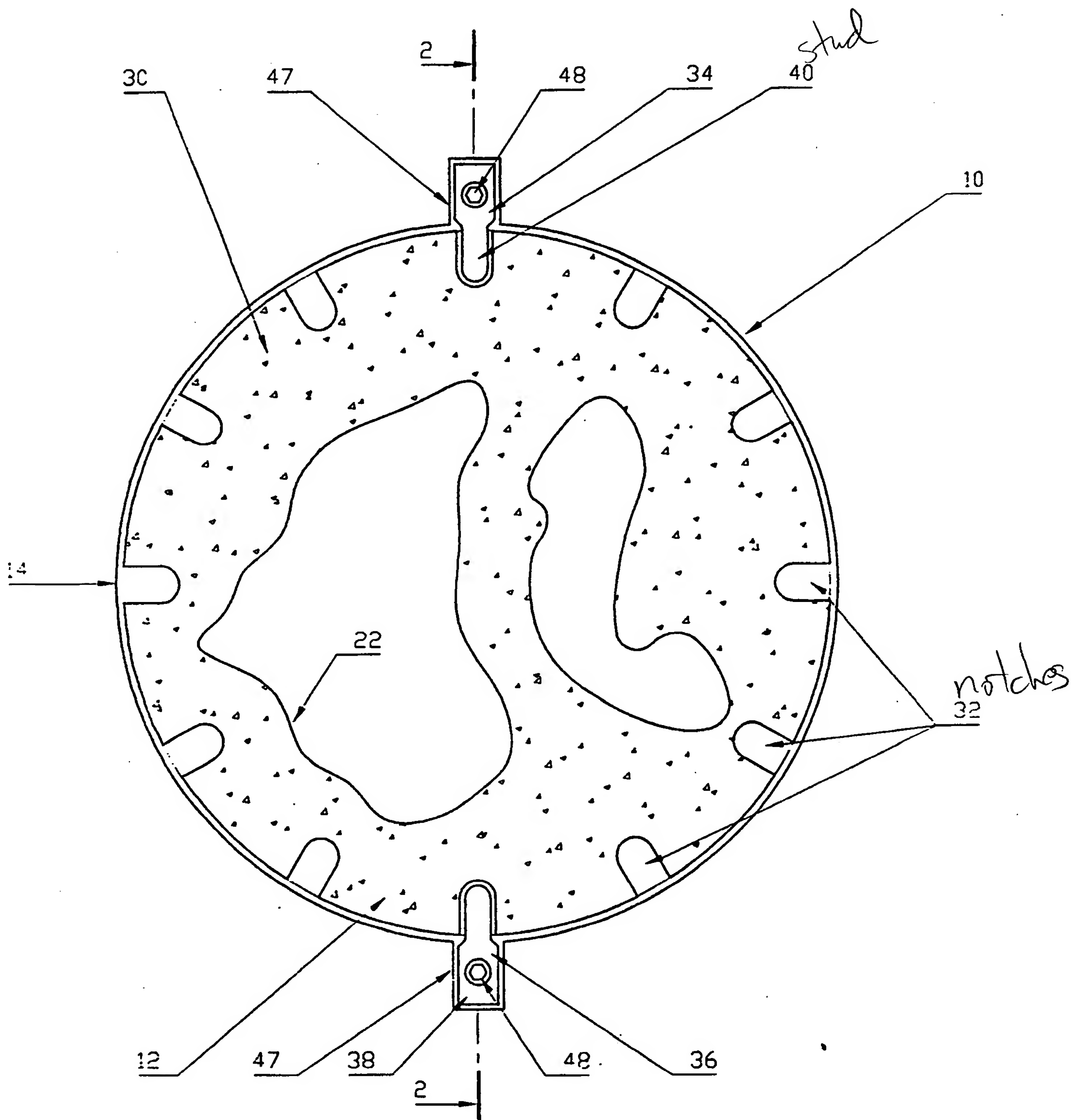


FIG 1

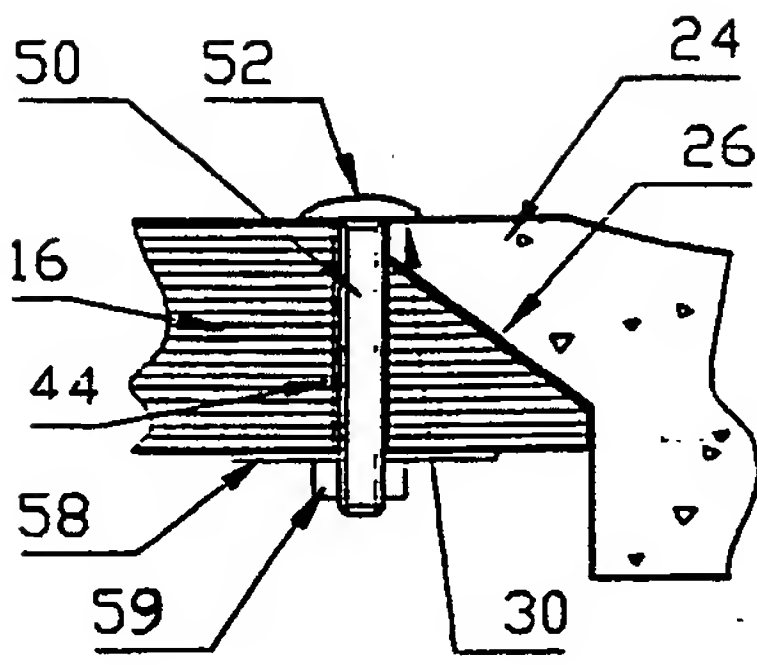


FIG 3

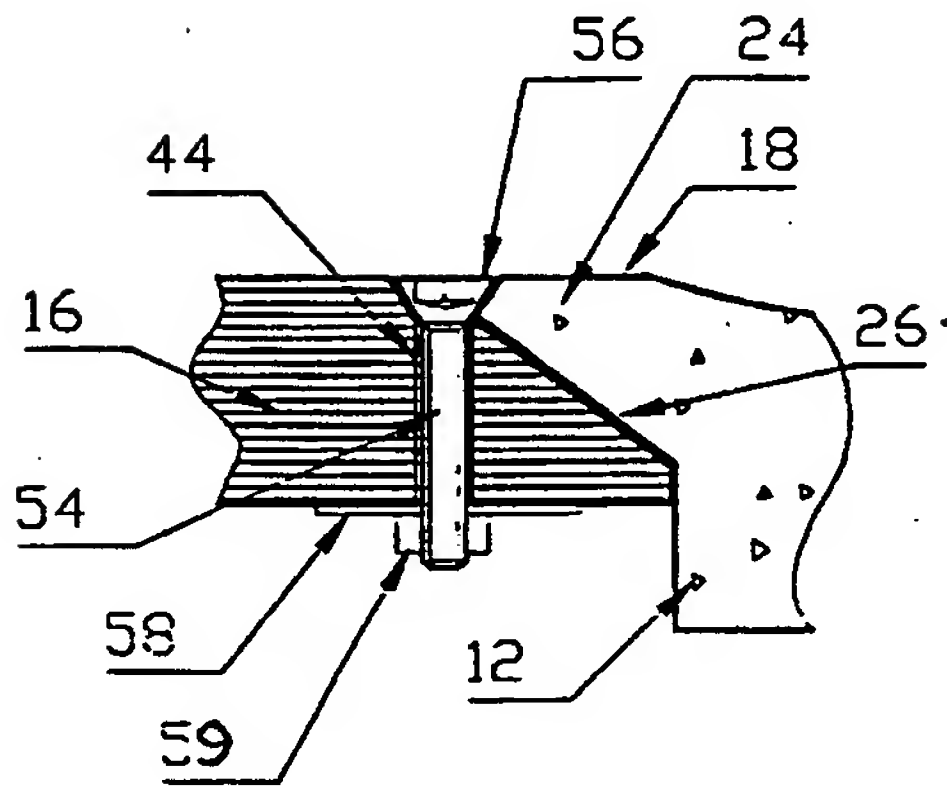


FIG 4

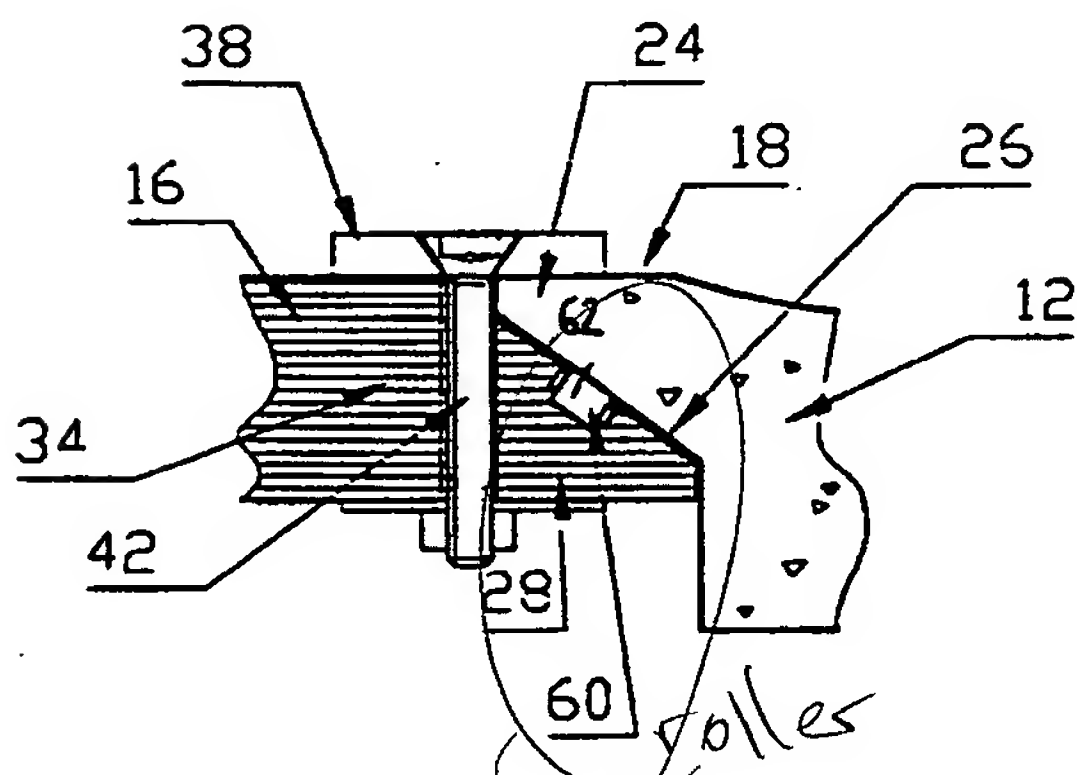
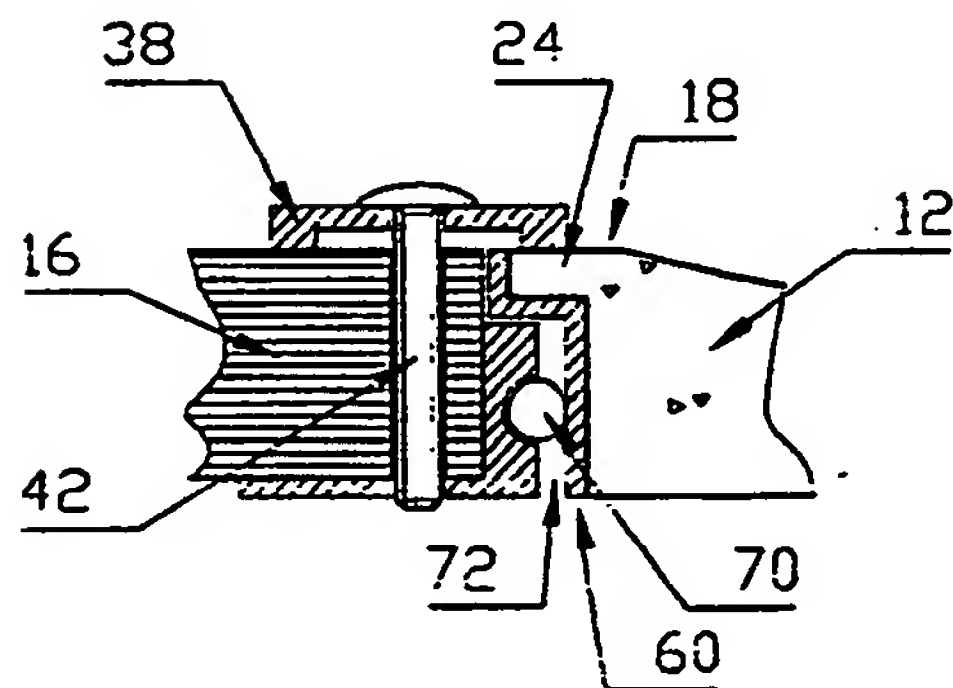
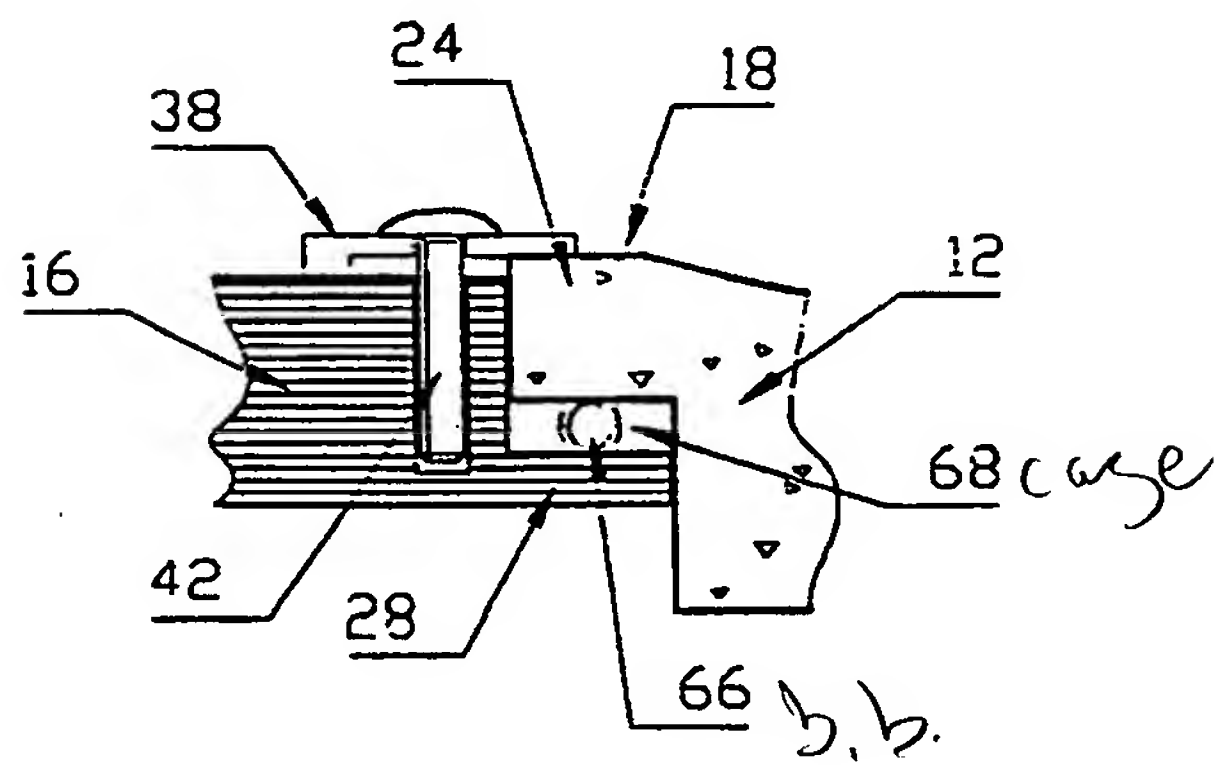
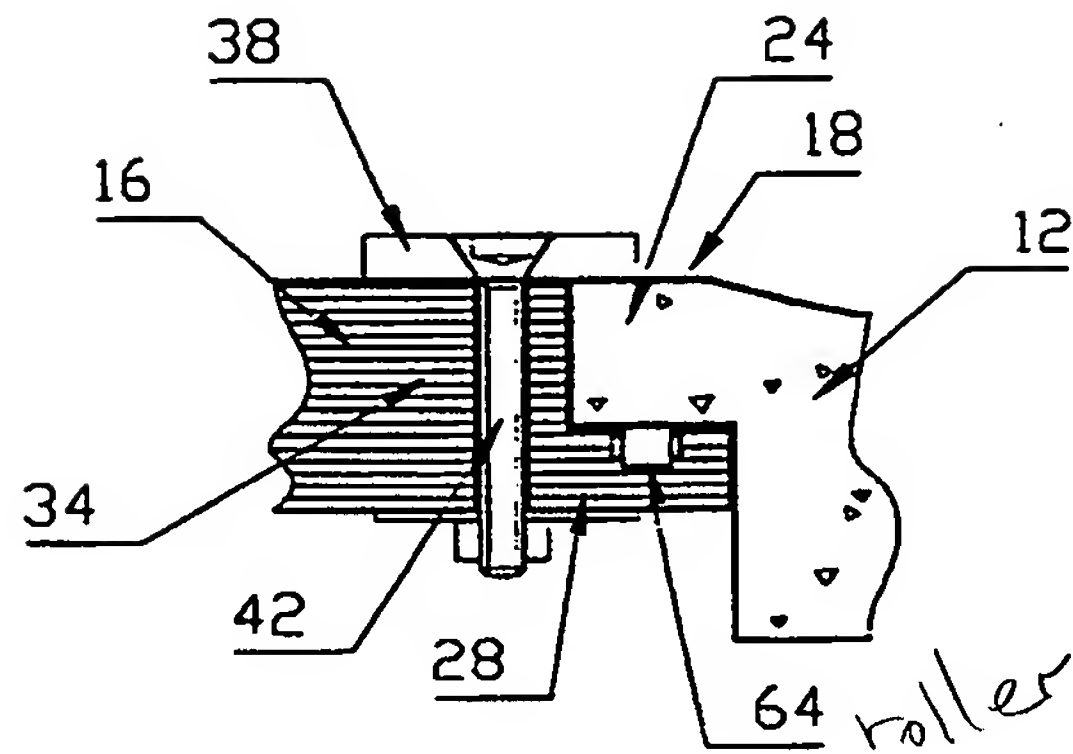
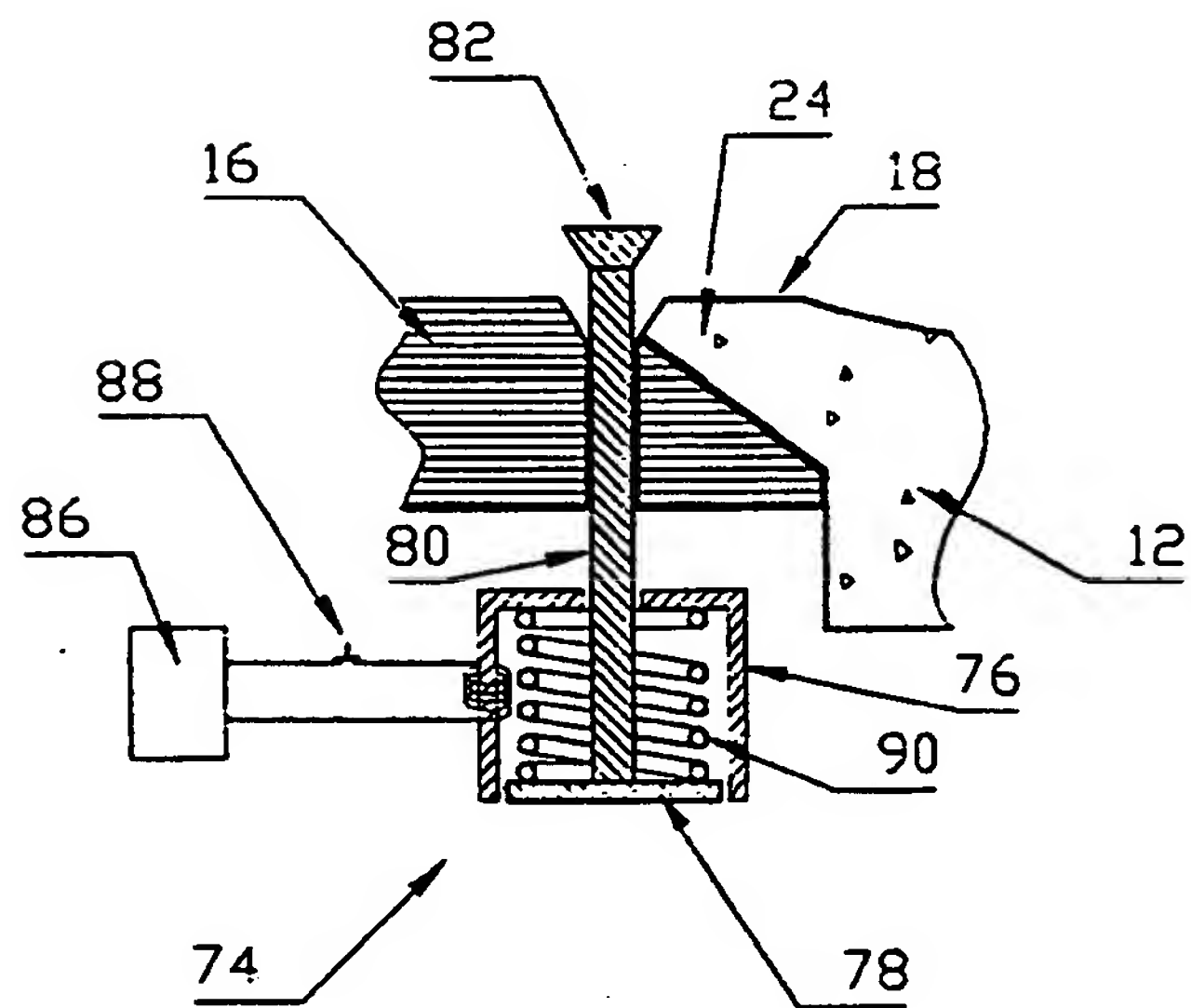
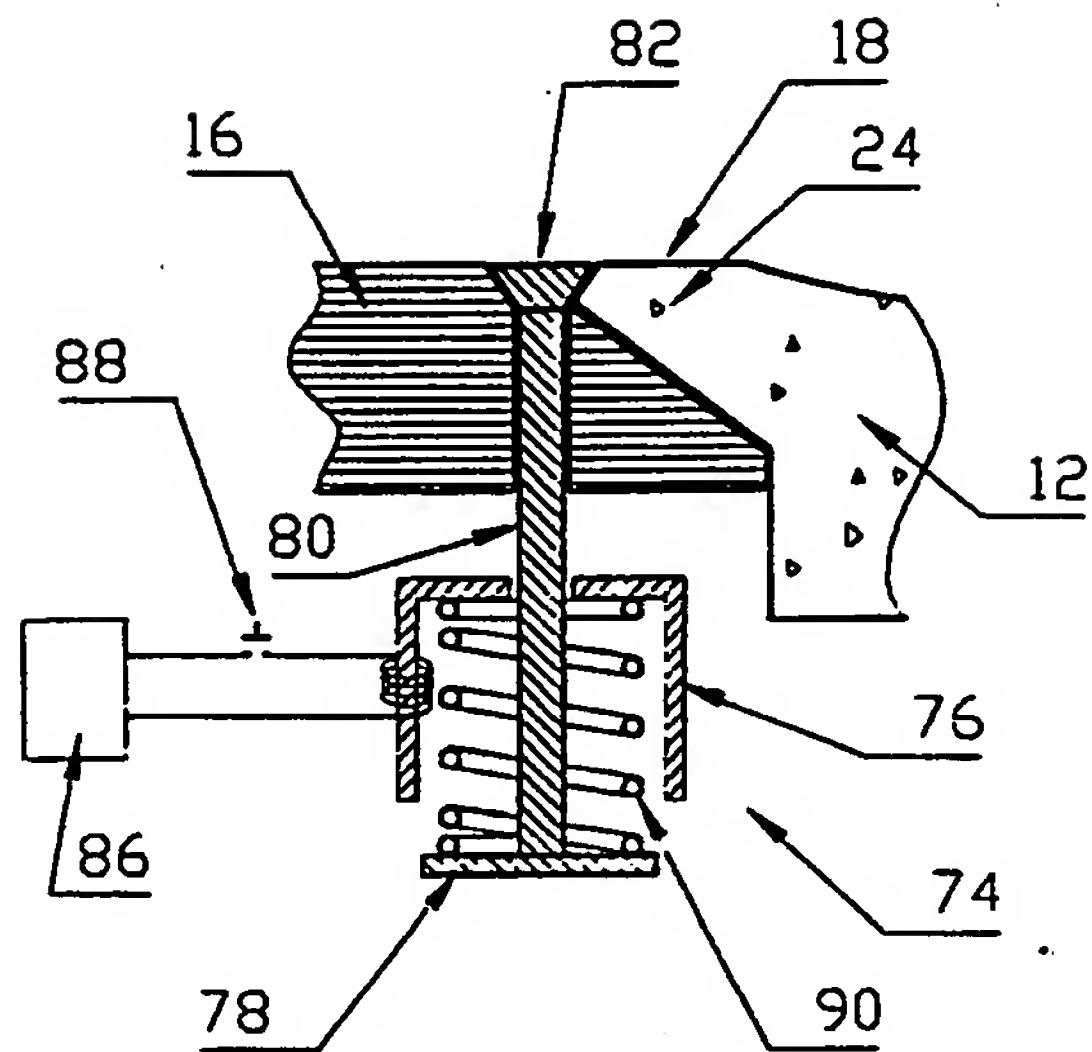


FIG 5





PATENTS ACT 1977

Agents' Reference: P9690GB-ALM/lp

DESCRIPTION OF INVENTION

Title: "A Releasable Climbing Iron For An Artificial Climbing Wall"

THIS INVENTION relates to a releasable climbing iron for an artificial climbing wall comprising:

a cylindrical cross-section body adapted to be adjusted by rotation in an aperture of matching shape in a panel of the wall;

- gripping means distributed over the front surface of the body, and
- fixing means adapted to take up a locked position and an unlocked position to respectively lock and unlock the body in a predetermined angular position.

In a known climbing iron device described in document FR-A 2 580 183 the releasable climbing iron is embodied by a circular member engaged for rotation and axial sliding in an aperture in the wall. The iron is immobilised at the required depth and in the required orientation by means of a screw having a central actuating head and co-operating at its opposite end with an expanding ring compressed by a clamping nut. The central location of the actuating head makes it difficult to sculpture the gripping elements on the front surface of the iron.

Some other known circular irons with central fixing are either devoid of means for inhibiting rotation of the body in the wall orifice or have an auxiliary stop element eccentrically disposed on the rear surface of the body to

immobilise the iron in rotation after clamping of the screw.

Another disadvantage of a circular climbing iron for a thin panel wall is the frequent need to pre-position a metal mount in the wall aperture to receive and support the iron. A specific mount of predetermined diameter and depth is associated with each iron. The need to use such a mount for each iron complicates the architecture of the climbing wall and increases its installation cost.

The Applicants' FR-A 2 627 988 discloses a fixing system for thin walls wherein the positioning of the assembly screws requires the presence of a number of apertures in the periphery of each circular climbing iron and for the screws to pass through the clamping zone on the panel edging. Production of such a climbing iron is complicated and it can be rotated for adjustment only after the screws have been completely unscrewed. The iron is fully released during the angular adjustment operation, which becomes a delicate one in some zones of the wall inter alia in overhanging parts.

It is the object of the invention to improve the fixing and angular adjustment system of a releasable circular climbing iron for an artificial climbing wall. In the climbing iron according to the invention, the body comprises a shoulder having a first bearing surface cooperating with edging of the panel, and a second locating surface disposed on the periphery of the front surface, and the fixing means are so received in at least one orifice in the panel as to exert when in the locked position a pressure on the second locating surface without extending through the clamping zone contrived between the first bearing surface and the edging.

In a preferred embodiment, the second locating surface is discontinuous, being formed with a sequence of radial notches co-operating with the fixing means, the notches being distributed at regular angular intervals around the periphery of the body.

Each fixing means comprises an assembly shoulder disposed on the front surface side of the panel and comprising:

- a retaining stud adapted to engage in a notch when the body is in a predetermined angular position, and
- a fixing screw which extends through the orifice to co-operate with a nut on the rear surface of the panel.

Very advantageously, the second locating surface has visualisation markings to facilitate adjustments of the irons and reduce the total time taken on a complete route in dependence upon the required difficulty.

According to a feature of the invention, the body comprises means for unlocking the first bearing surface permitting a limited axial translational withdrawal movement and the projecting of the front surface after the fixing means have changed over from the locked position to the unlocked position. The body is non-losable while being rotated into the selected angular position.

It is also possible to use a continuous second locating surface to enable the body to be locked in any angular position.

In another embodiment, each fixing means comprises a screw having an anchoring head engaging directly with the second locating surface in the locked position.

Rolling means, inter alia of the ball type or roller type, can be arranged between the edging and the first bearing surface to reduce friction forces when the body is rotated for adjustment after the fixing means have changed over from the locked position to the unlocked position.

In another embodiment the iron can be released by means of an electric actuator, inter alia a solenoid.

In order that the invention may be more readily understood, embodiments thereof will now be described, by way of example, with reference to the accompanying drawings, wherein:

Fig. 1 is an elevation of a climbing iron embodying the invention;

Fig. 2 is a view in section on the line 2-2 of Fig. 1;

Fig. 3 is a partial view in section of another kind of screw fixing;

Fig. 4 is a view similar to Fig. 3 of a constructional variant;

Figs. 5 to 8 are views in section of another form of fixing having various kinds of rolling element;

Fig. 9 is a view similar to Fig. 4 of a fixing device actuated by a solenoid which is shown in its inoperative position corresponding to the iron being in the locked state, and

Fig. 10 is a view similar to Fig. 9 with the solenoid in the operative position corresponding to the iron being in the unlocked state.

Referring to Figs. 1 and 2 a climbing iron 10 for an artificial climbing wall comprises a cylindrical cross-section body 12 introducible into an aperture 14 of matching shape in the wall. The iron 10 is produced by moulding of a predetermined material inter alia cement or synthetic resin.

The wall consists of a panel 16 having a plane surface and made of a rigid material inter alia concrete or timber, the thickness of the panel being less than the depth of the body 12 of the iron 10.

The front surface 18 of the body 12 is disposed substantially in the plane of the visible outside surface 20 of the panel 16 when the iron 10 is engaged in the aperture 14.

The central first part of the front surface 18 has gripping means 22 in the form of moulded sunk or relief sculptures.

The body 12 has a shoulder 24 having a truncoconical first bearing surface 26 abutting an edging 28 of companion shape. The edging 28 is contrived in the panel 16 coaxially around the aperture 14.

The shoulder 24 has a second locating surface 30 disposed visibly on the periphery of the front surface 18 and formed with a sequence of radial notches 32 co-operating with fixing means 34, 36. The notches 32 are distributed at regular angular offsets around the second locating surface 30 to facilitate angular adjustment of the iron 10.

The fixing means 34, 36 are identical and are two in number and are disposed diametrically opposite one another in the embodiment of Fig. 1.

Each fixing means 34, 36 comprises an assembly shoulder 38 having a retaining stud 40 engageable in a notch 32 in a predetermined angular position of the body 12. The shoulder 38 is associated with a fixing screw 42 which extends through an orifice 44 in the panel 16 to co-operate with a nut 46.

The orifice 44 is spaced apart radially from the edging 28 and tightening the screw 42 presses the stud 40 against the shoulder 24 to lock the truncoconical first bearing surface 26 against the edging 28.

The depth of the notches 32 is constant along the second locating surface 30 and corresponds substantially to the thickness of the stud 40. The other part of the shoulder 38 is received with reduced clearance in a rectangular groove 47 in the panel 16 near the orifice 40.

Advantageously, the screw 42 has a countersunk head 48 received completely in an aperture of matching shape in the shoulder 38. Since the fixing means 34, 36 are flush mounted in the corresponding grooves 46 and notches 32 there are no projecting parts. The fixing screw 42 of each

shoulder 38 does not extend through the clamping zone defined by the first bearing surface 26 of the shoulder 24 on the edging 28.

To adjust the iron 10 manually into a predetermined angular position, the screw 42 of each shoulder 38 is first slackened to leave sufficient axial clearance between the second locating surface 30 of the shoulder 24 and the stud 40. Thanks to this clearance the body 12 can make first a forwards translational movement to release the first bearing surface 26, followed by a second and limited rotation in the aperture 14 as far as a predetermined angular position.

The screws 42 can then be retightened to immobilise the iron 10 in the selected position. This adjustment operation is rapid and the nut 46 remains permanently engaged on the screwthreaded part of the screw 42 so that the body 12 is captive. There is therefore no risk of the iron 10 or fixing means 34, 36 dropping during the rotational adjustment.

Visible check marks (not shown) can be contrived on the base of the various notches 32 to facilitate the adjustment operation. A complete range of climbing routes can then be defined and recorded for each kind of iron 10 in dependence upon the required difficulty. The check marks can take the form of figures or indicia of any kind with or without colour.

In a variant (not shown) the periphery of the iron 10 is devoid of locating notches 32. The retaining stud 40 then projects slightly from the front surface 18. This feature permits continuous rotational adjustment, the iron 10 being lockable in any angular position.

Figs. 3 and 4 show two other embodiments which use other fixing means not requiring an assembly shoulder 38. The locking function of the iron 10 is provided by the head of the fixing screw.

In Fig. 3 a screw 50 having a round head 52 extends through orifice 44 in panel 16, the head 52 bearing to some extent on the second locating surface 30 of the shoulder 24. The end thereof is in light contact with the screwthreaded part of the screw 50. This kind of mounting of the screw 50 in the peripheral interface permits the use of standard cylindrical irons.

Referring to Fig. 4 a screw 54 extends through the orifice 44 and has a countersunk head 56 disposed in the plane of the front surface 18 of the iron 10. The truncoconical bearing surface of the head 56 engages directly with a companion/surface of the shoulder 24 to lock the body 12 in a predetermined angular position in the aperture 14.

In the two forms of fixing shown in Figs. 3 and 4 that end of the screw 50, 54 which is remote from the head 52, 56 co-operates by way of a washer 58 with a nut 59.

The system for adjusting the iron of Figs. 3 and 4 is similar to the system hereinbefore described.

The embodiments shown in Figs. 5 to 8 use auxiliary rolling means 60 to reduce the friction forces arising during rotational adjustment of the iron 10.

In Fig. 5 the rolling means 60 comprise a ring of oblique rollers 62 co-operating with the truncoconical first bearing surface 26 of the shoulder 24. The roller ring 62 is rigidly secured to the panel edging 28.

Referring to Fig. 6, the rollers 64 extend in an axial gap between two parallel surfaces of the shoulder 24 and edging 28 respectively. In Fig. 7 the rollers 64 are replaced by a ball bearing 66 having an annular cage disposed in the axial gap 68.

Referring to Fig. 8 the rolling means 60 comprise a ball bearing 70 disposed in a radial gap 72 between two parallel surfaces of the panel 16 and body 12 respectively.

The reaction of the rolling elements 60 after slackening of the screws 42 means that only a moderate actuating force is required to rotate the body 12 towards the selected angular position. Retightening the screws 42 on the completion of adjustment locks the roller bearings 62, 64 or ball bearings 66, 70 to immobilise the body 12 in translation and in rotation.

In the embodiment shown in Figs. 9 and 10 an actuating solenoid 74 is used to unlock the iron 10. The solenoid comprises a U-shaped fixed magnetic circuit 76 and a moving ferromagnetic armature 78 to which an actuating rod 80 is secured. At the end remote from the armature 78 the rod 80 has a retaining head 82 adapted to co-operate with shoulder 24 of body 12. An energising winding 84 is wound on the magnetic circuit 76 and is electrically connected to a power supply 86 by way of a switch 88. The same can be operated by a simple push button or by a

bistable control mechanism. A return spring 90 biases the armature 78 towards an inoperative spaced-apart position in which the retaining head 82 locks the body 12 in the aperture in the panel 16.

Closing the switch 88 energises the winding 84 and attracts the armature 78 into an operative position in which it engages the pole faces of the magnetic circuit 76. The simultaneous movement of the rod 80 causes the retaining head 82 to project and thus unlock the iron 10. The body 12 can then be turned manually into a different angular position. To lock the iron 10 in this new position the switch 88 is opened to de-energise the winding 84. The armature 78 is returned by the return spring 90 into the inoperative position in which it is distant from the magnetic circuit, and the retaining head 82 automatically returns into bearing engagement with the shoulder 24 to immobilise the body 12 in the locked position.

The solenoid 74 can be replaced by any other form of electrical actuation to unlock the rod 80.

C L A I M S

1. A releasable climbing iron for an artificial climbing wall comprising: a cylindrical cross-section body adapted to be adjusted by rotation in an aperture of matching shape in a panel of the wall; gripping means distributed over a front surface of the body; and fixing means adapted to take up a locked position and an unlocked position respectively to lock and unlock the body in a predetermined angular position; in which climbing iron the body comprises a shoulder having a first bearing surface co-operating with edging of the panel and a second locating surface disposed on the periphery of the front surface, and the fixing means are so received in at least one orifice in the panel as to exert, when in the locked position, a pressure on the second locating surface without extending through the clamping zone contrived between the first bearing surface and the edging.

2. A climbing iron according to claim 1, in which the second locating surface is discontinuous, being formed with a sequence of radial notches co-operating with the fixing means, the notches being distributed at regular angular intervals around the periphery of the body.

3. A climbing iron according to claim 2, in which in each fixing means comprises an assembly shoulder disposed on the front surface side of the panel and comprising: a retaining stud adapted to engage in a notch when the body is in a predetermined angular position; and a fixing screw which extends through the orifice to co-operate with a nut on the rear surface of the panel.

4. A climbing iron according to claim 3, in which the depth of each notch corresponds substantially to the thickness of the retaining stud and the other part of the assembly shoulder is integrated in a matching groove in the front surface of the panel.

5. A climbing iron according to any preceding claim in which the second locating surface has visible check marks adapted to the angular adjustment of the body in the aperture.

6. A climbing iron according to claim 1, in which the body comprises means for unlocking the first bearing surface permitting a limited axial translational withdrawal movement after the fixing means have changed over from the locked position to the unlocked position.

7. A climbing iron according to claim 1 or 6, in which the second locating surface is continuous to enable the body to be adjusted in any angular position.

8. A climbing iron according to claim 6 or 7, in which each fixing means comprises a screw having an anchoring head engaging directly with the second locating surface in the locked position.

9. A climbing iron according to any one of claims 1 to 8, in which rolling means are arranged between the edging and the first bearing surface to reduce friction forces when the body is rotated for adjustment after the fixing means have changed over from the locked position to the unlocked position.

10. A climbing iron according to claim 9, in which the rolling means is of the ball type or roller type.

11. A climbing iron according to any one of claims 1 to 10, in which each fixing means has an actuating rod rigidly secured to a movable armature of a solenoid comprising: a fixed magnetic circuit associated with a winding electrically connected to a power supply by way of a switch, energisation of the winding causing the armature to be attracted into an operative position corresponding to the rod moving into the unlocked position; and a return spring urging the armature into an inoperative position after de-energisation of the winding for automatic return of the rod to the locked position.

12. A climbing iron substantially as hereinbefore described with reference to the accompanying drawings.



Application No: GB 9506608.0
Claims searched: 1-12

Examiner: Alan Blunt
Date of search: 17 May 1995

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.N): A6M (MBL, MBX)

Int Cl (Ed.6): A63B 69/00

Other: On-line Database: WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB2267651A Turner	1

X Document indicating lack of novelty or inventive step
Y Document indicating lack of inventive step if combined with one or more other documents of same category.
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